

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Application of:

BEAUVENT et al.

Application No. Unassigned

Art Unit: Unassigned

Filed: August 21, 2001

Examiner: Unassigned

For: METHOD AND  
APPARATUS FOR  
MAKING ALUMINATE  
CEMENT

**PRELIMINARY AMENDMENT**

Commissioner for Patents  
Washington, D. C. 20231

Dear Sir:

Prior to the examination of the above-identified patent application, please enter the following amendments and consider the following remarks.

*IN THE TITLE:*

At page 1, line 1, add the title:

METHOD AND APPARATUS FOR MAKING ALUMINATE CEMENT

*IN THE SPECIFICATION:*

Before the paragraph beginning at page 1, line 1, insert as a heading:

Field Of The Invention

Before the paragraph beginning at page 1, line 7, insert as a heading:

Background

Before the paragraph beginning at page 2, line 14, insert as a heading:

#### Summary Of The Invention

Before the paragraph beginning at page 6, line 5, insert as a heading:

#### Brief Description Of The Drawings

Before the paragraph beginning at page 6, line 15, insert as a heading:

#### Detailed Description

Replace the paragraph beginning at page 13, line 5, with:

According to an embodiment that is not represented, the plates 13 can be prepared by compression of the constituents of the mixture 2 in the form of powder, and in the shape of a tablet. In this case, it is necessary to ensure good homogeneity of the powder. In order to improve the cohesion of the mixture 2 forming the plates, it is possible to carry out compression in the presence of steam. Of course, the step of mixing by the first mixer 22 in the tank 21 is, in this instance, not used, and the use of water is prohibited.

#### IN THE CLAIMS

Cancel claim 19 and replace the indicated claims with:

1. (Amended) A process of manufacturing cement from a first raw mix including a mixture of (i)  $\text{CaCO}_3$ , (ii) at least one of  $\text{Al}_2\text{O}_3$  and  $\text{Al}(\text{OH})_3$ , (iii)  $\text{CaSO}_4$ , and (iv) at least one of  $\text{SiO}_2$  and a product containing silica or silicates, such as clay, in the anhydrous or hydrated form, the process including treating the mixture before a clinkering stage by movement in the center of a kiln, in a sheet with approximately constant thickness, at approximately constant speed, along a treatment path having a positive temperature gradient, and for a treatment time, during which the mixture remains below its melting temperature, to produce a sulfoaluminate cement, clinkering to produce a clinkered mixture, and cooling the clinkered mixture upon exit from the treatment path.

2. (Amended) The process of manufacturing cement according to Claim 1, wherein the mixture contains  $\text{Al}_2(\text{SO}_4)_3$  in anhydrous or hydrated form.

3. (Amended) The process of manufacturing cement according to Claim 2, wherein the mixture includes up to 10 wt.% of  $\text{Al}_2(\text{SO}_4)_3$ .

4. (Amended) The process of manufacturing cement according to Claim 1, wherein the mixture contains at least one mineral phase including at least one iron oxidation product for obtaining a second raw mix, said cement being a ferroaluminate cement.

5. (Amended) The process of manufacturing cement according to Claim 1, wherein the mixture contains an oxide of a transition metal chosen from the group consisting of Sc, Ti, V, Cr, Mn, Co, Ni, Cu, Zn, Y, Zr, Nb, Mo, Cd, La, Hf, Ta, and W.

6. (Amended) The process of manufacturing cement according to Claim 5, wherein the mixture contains 5-10 wt% of the transition metal oxide.

7. (Amended) The process of manufacturing cement according to Claim 1, including preparing the mixture by (i) mixing of each of the constituents of the mixture with water to obtain a slurry, (ii) filtering said slurry to obtain a pasty residue, (iii) transforming said pasty residue for introduction into the center of the kiln.

8. (Amended) The process of manufacturing cement according to Claim 7, including transforming the pasty residue by mixing, and extruding plates or strips with approximately constant thickness.

9. (Amended) The process of manufacturing cement according to Claim 4, including depositing the second raw mix on an underlayer of the first raw mix before clinkering.

10. (Amended) The process of manufacturing cement according to Claim 1, including moving the mixture in the center of the kiln on rollers.

11. (Amended) The process of manufacturing cement according to Claim 10, wherein the rollers are silicon carbide.

12. (Amended) The process of manufacturing cement according to Claim 11, wherein the rollers are coated with at least one of silicon and  $\text{MgO-ZrO}_2$ .

13. (Amended) The process of manufacturing cement according to Claim 10, wherein the rollers are coated with a refractory stainless steel with a melting point higher than  $1400^\circ\text{C}$ .

14. (Amended) The process of manufacturing cement according to Claim 13, wherein the coating of refractory stainless steel consists of sleeves mounted for freely rotating around a roller.

15. (Amended) The process of manufacturing cement according to Claim 13, wherein the refractory stainless steel coating is an Inconel® alloy.

16. (Amended) The process of manufacturing cement according to Claim 1, including clinkering in the presence of oxygen.

17. (Amended) The process of manufacturing cement according to Claim 1, wherein the mixture is subjected, along the treatment path, successively to drying and/or dehydration, decarbonation, and clinkering.

18. (Amended) The process of manufacturing cement according to Claim 1, including milling the clinkered mixture and mixing the clinkered mixture, after milling, with at least one material selected from the group consisting of limestone, gypsum, anhydrite, heavy metals, and oxidation compounds of heavy metals.

20. (Amended) An apparatus for manufacture of a cement consisting of a tank, a first mixer for preparing a first raw mix from a mixture consisting of the compounds  $\text{CaCO}_3$ ,  $\text{Al}_2\text{O}_3$  and/or  $\text{Al}(\text{OH})_3$ ,  $\text{CaSO}_4$ ,  $\text{SiO}_2$  and/or a product containing silica or silicates, such as clay, a kiln having a kiln center for treating the mixture up to clinkering by movement in said kiln center with a sheet of approximately constant thickness, at approximately constant speed, along a treatment path having a positive temperature gradient, and for a treatment time during which the mixture remains below its melting temperature, and equipment for rapid cooling of a clinkered mixture upon exit from the treatment path.

21. (Amended) The apparatus for manufacture of a cement according to Claim 20, including (i) a first mixer associated with said tank for producing a slurry during combination of the mixture with water, (ii) a filter press for filtration of the slurry in order to obtain a pasty residue, and (iii) an extruder for transforming said pasty residue into plates or strips with approximately constant thickness for introduction into the kiln.

22. (Amended) The apparatus for manufacture of a cement according to Claim 21, including a mixer for homogenization of the pasty residue prior to introduction into the extruder.

23. (Amended) The apparatus for manufacture of a cement according to Claim 20, wherein the center of the kiln includes rollers for movement of the mixture.

24. (Amended) The apparatus for manufacture of a cement according to Claim 20, including means for adding at least one mineral phase including at least one iron oxidation product for obtaining a second raw mix.

25. (Amended) The apparatus for manufacture of a cement according to Claim 24, including means for depositing the second raw mix on an underlayer of the first raw mix before clinkering.

26. (Amended) The apparatus for manufacture of a cement according to Claim 20, including a first grinding mill for grinding the clinkered mixture to produce a ground clinkered mixture, a second mixer in which there is added to the ground clinkered mixture milled limestone and/or gypsum and/or milled anhydrite, and heavy metals or oxidation compounds of milled heavy metals.

*IN THE ABSTRACT*

Replace the abstract with:

Abstract

A process of manufacturing a sulfoaluminate or ferroaluminate cement, and an apparatus for the manufacture. The cement is manufactured from a mixture containing  $\text{CaCO}_3$ ,  $\text{Al}_2\text{O}_3$  and/or  $\text{Al}(\text{OH})_3$ ,  $\text{CaSO}_4$ ,  $\text{SiO}_2$  and/or a product containing silica or silicates such as clay, these compounds being present in the anhydrous or hydrated form. In this process, the mixture is treated up to clinkering by movement in a center of a kiln, in a sheet with approximately constant thickness, at approximately constant speed, along a treatment path having a positive temperature gradient, and for a treatment time during which the mixture remains below its melting temperature. The mixture is clinkered to produce a clinkered mixture that is cooled upon exit from the treatment path.

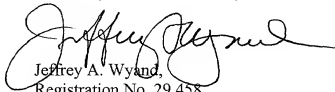
In re Application of Beauvent et al.  
Application No. Unassigned

**REMARKS**

The foregoing amendments are made to correct minor translational errors and to meet United States requirements as to form. No new matter is added.

Respectfully submitted,

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**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Application of:

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For: METHOD AND  
APPARATUS FOR  
MAKING ALUMINATE  
CEMENT

**AMENDMENTS TO SPECIFICATION, CLAIMS AND  
ABSTRACT MADE VIA PRELIMINARY AMENDMENT**

Before the paragraph beginning at page 1, line 1, insert as a heading:

Field Of The Invention

Before the paragraph beginning at page 1, line 7, insert as a heading:

Background

Before the paragraph beginning at page 2, line 14, insert as a heading:

Summary Of The Invention

Before the paragraph beginning at page 6, line 5, insert as a heading:

Brief Description Of The Drawings

Before the paragraph beginning at page 6, line 15, insert as a heading:

Detailed Description



Amendments to the paragraph beginning at page 13, line 5:

According to an embodiment ~~method~~ that is not represented, the plates 13 can be prepared by compression of the constituents of the mixture 2 in the form of powder, and in the shape of a tablet. In this case, it is necessary to ensure good homogeneity of the powder. In order to improve the cohesion of the mixture 2 forming the plates, it is possible to carry out compression in the presence of steam. Of course, the step of mixing by the first mixer 22 in the tank 21 ~~is now useless, in this instance, not used~~, and the use of water is prohibited.

Amendments to the existing claims:

1. (Amended) ~~Manufacturing~~ A process of manufacturing cement ~~(1)~~ from a first raw mix ~~(8)~~ formed from including a mixture (2) consisting of compounds (i)  $\text{CaCO}_3$ , (ii) at least one of  $\text{Al}_2\text{O}_3$  and/or  $\text{Al}(\text{OH})_3$ , (iii)  $\text{CaSO}_4$ , and (iv) at least one of  $\text{SiO}_2$  and/or a product containing silica or silicates, such as clay, all these compounds being present in the anhydrous or hydrated form, individually or in combination, characterized in that the process including treating the mixture (2) is treated up to before a clinkering stage by movement in the center ~~(3)~~ of a kiln ~~(4)~~, in a sheet ~~(5)~~ with approximately constant thickness, at approximately constant speed, along a treatment path ~~(6)~~ subjected to having a positive temperature gradient, and for a treatment time, during which ~~this the~~ mixture ~~(2)~~ remains below its melting temperature, and in that the clinkered mixture ~~(7)~~ forming to produce a sulfoaluminate cement is cooled, clinkering to produce a clinkered mixture, and cooling the clinkered mixture upon exit from the treatment path (6).

2. (Amended) ~~Manufacturing~~ The process of manufacturing cement ~~(1)~~ according to Claim 1, ~~characterized in that wherein~~ the mixture ~~(2)~~ contains, ~~in addition~~,  $\text{Al}_2(\text{SO}_4)_3$  in anhydrous or hydrated form.

3. (Amended) ~~Manufacturing~~ The process of manufacturing cement ~~(1)~~ according to Claim 2, ~~characterized in that wherein~~ the mixture includes up to 10 wt.% of  $\text{Al}_2(\text{SO}_4)_3$  ~~is added to the mixture (2) up to 10 wt.%.~~

4. (Amended) ~~Manufacturing~~The process of manufacturing cement ~~(1)~~ according to ~~any one of the preceding claims~~ Claim 1, characterized in that wherein the mixture ~~(2)~~, ~~in addition,~~ contains at least one mineral phase ~~high in~~ including at least one iron oxidation product for obtaining a second raw mix ~~(9)~~, said cement ~~then forming being a~~ ferroaluminate cement.

5. (Amended) ~~Manufacturing~~The process of manufacturing cement ~~(1)~~ according to ~~any one of the preceding claims~~ Claim 1, characterized in that wherein the mixture ~~(2)~~, ~~in addition,~~ contains ~~a an oxide of a transition metal oxide~~ chosen from the group consisting of Sc, Ti, V, Cr, Mn, Co, Ni, Cu, Zn, Y, Zr, Nb, Mo, Cd, La, Hf, Ta, and W.

6. (Amended) ~~Manufacturing~~The process of manufacturing cement ~~(1)~~ according to Claim 5, characterized in that wherein the mixture ~~(2)~~ contains up to 5-10 wt% of the transition metal oxide.

7. (Amended) ~~Manufacturing~~The process of manufacturing cement ~~(1)~~ according to ~~any one of the preceding claims~~ Claim 1, characterized in that including preparing the mixture ~~(2)~~ is prepared by the steps of (i) mixing of each of ~~it's~~ the constituents of the mixture with water to obtain a slurry ~~(11)~~, (ii) filtering said slurry ~~(11)~~ to obtain a pasty residue ~~(12)~~, (iii) transforming said pasty residue ~~(12)~~ with a view to its for introduction into the center ~~(3)~~ of the kiln ~~(4)~~.

8. (Amended) ~~Manufacturing~~The process of manufacturing cement ~~(1)~~ according to Claim 7, characterized in that including transforming the pasty residue ~~(12)~~ is transformed by mixing, ~~then by extrusion in and extruding plates or in strips (13)~~ with approximately constant thickness.

9. (Amended) ~~Manufacturing~~The process of manufacturing cement ~~(1)~~ according to ~~any one of the preceding claims in combination with~~ Claim 4, characterized in that including depositing the second raw mix ~~(9)~~ is deposited on an underlayer ~~(15)~~ of the first raw mix ~~(8)~~ before clinkering.

10. (Amended) ~~Manufacturing~~ The process of sulfoaluminate manufacturing cement ~~(1)~~ according to ~~any one of the preceding claims Claim 1, characterized in that the~~ movement of including moving the mixture ~~(2)~~ in the center ~~(3)~~ of the kiln ~~(4)~~ is carried out on rollers ~~(14)~~.

11. (Amended) ~~Manufacturing~~ The process of manufacturing cement ~~(1)~~ according to Claim 10, ~~characterized in that at least wherein~~ the rollers ~~(14)~~ present in a clinkering zone ~~(16)~~ of the center (3) of the kiln (4) are made of silicon carbide.

12. (Amended) ~~Manufacturing~~ The process of manufacturing cement ~~(1)~~ according to Claim 11, ~~characterized in that at least wherein~~ the rollers ~~(14)~~ present in the clinkering zone ~~(16)~~ of the center (3) of the kiln (4) are coated with at least one of silicon and/or MgO-ZrO<sub>2</sub>.

13. (Amended) ~~Manufacturing~~ The process of manufacturing cement ~~(1)~~ according to Claim 10, ~~characterized in that at least wherein~~ the rollers ~~(14)~~ present in clinkering zone ~~(16)~~ of the center (3) of the kiln (4) are coated with a refractory stainless steel with a melting point higher than 1400°C.

14. (Amended) ~~Manufacturing~~ The process of manufacturing cement ~~(1)~~ according to Claim 13, ~~characterized in that wherein~~ the coating of refractory stainless steel consists of sleeves ~~(24)~~ mounted such that each can for freely rotate rotating around a roller ~~(14)~~.

15. (Amended) ~~Manufacturing~~ The process of manufacturing cement ~~(1)~~ according to Claim 13 ~~or 14, characterized in that wherein~~ the refractory stainless steel coating is an Inconel® alloy ~~with a high content of nickel of the Inconel® type.~~

16. (Amended) ~~Manufacturing~~ The process of manufacturing cement ~~(1)~~ according to ~~any one of the preceding claims Claim 1, characterized in that the~~ including clinkering ~~is carried out~~ in the presence of oxygen.

17. (Amended) ~~Manufacturing~~ The process of manufacturing cement (1) according to ~~any one of the preceding claims Claim 1, characterized in that wherein~~ the mixture (2) is subjected, along the treatment path (6), successively to (I) possibly drying and/or dehydration, (II) decarbonation, and (III) clinkering.

18. (Amended) ~~Manufacturing~~ The process of manufacturing cement (1) according to ~~any one of the preceding claims Claim 1, characterized in that including~~ milling the clinkered mixture (7) is milled and mixed mixing the clinkered mixture, after milling, with at least one material selected from the group consisting of limestone and/or, gypsum and/or, anhydrite and possibly, heavy metals or, and oxidation compounds of heavy metals.

20. (Amended) ~~Installation~~ An apparatus for manufacture of a cement (1) consisting of a tank (21) and, a first mixer (22) for preparing a first raw mix (8) formed by from a mixture (2) consisting of the compounds  $\text{CaCO}_3$ ,  $\text{Al}_2\text{O}_3$  and/or  $\text{Al}(\text{OH})_3$ ,  $\text{CaSO}_4$ ,  $\text{SiO}_2$  and/or a product containing silica or silicates, such as clay, ~~all these compounds being present in anhydrous or hydrated form, individually or in combination, characterized in that the installation consists of a kiln (4) and having a kiln center (3) to treat for treating the mixture (2) up to clinkering by movement in said kiln center (3) with a sheet (5) of approximately constant thickness, at approximately constant speed, along a treatment path (6) subjected to having a positive temperature gradient, and for a treatment time during which this the mixture (2) remains below its melting temperature, and in that the installation consists of equipment for rapid cooling (23) of the a clinkered mixture (7) upon exit from the treatment path (6).~~

21. (Amended) ~~Installation~~ The apparatus for manufacture of a cement (1) according to Claim 20, ~~characterized in that it includes including~~ (i) a first mixer (22) associated with ~~a said tank (21) for obtaining producing a slurry (11) during the combination of the mixture (2) with the water,~~ (ii) a filter press (25) for filtration of ~~said the slurry (11) in order to obtain a pasty residue (12), and (iii) an extruder (27) for~~

transforming said pasty residue ~~(12)~~, into plates or strips ~~(13)~~ with approximately constant thickness ~~with a view to its~~ for introduction into the kiln ~~(4)~~.

22. (Amended) ~~Installation~~ The apparatus for manufacture of a cement ~~(1)~~ according to Claim 21, ~~characterized in that it includes~~ including a mixer ~~(28)~~ for homogenization of the pasty residue ~~(12)~~ prior to ~~its~~ introduction into the extruder ~~(27)~~.

23. (Amended) ~~Installation~~ The apparatus for manufacture of a cement ~~(1)~~ according to ~~any one of Claims Claim~~ Claim 20-22, ~~characterized in that wherein~~ in the center ~~(3)~~ of the kiln ~~(4)~~ includes rollers ~~(14)~~ for movement of the mixture ~~(2)~~.

24. (Amended) ~~Installation~~ The apparatus for manufacture of a cement ~~(1)~~ according to ~~any one of Claims Claim~~ Claim 20-23, ~~characterized in that it consists of~~ including means for adding at least one mineral phase ~~high in~~ including at least one iron oxidation product for obtaining a second raw mix ~~(9)~~.

25. (Amended) ~~Installation~~ The apparatus for manufacture of a cement ~~(1)~~ according to Claim 24, ~~characterized in that it consists of~~ including means for depositing the second raw mix ~~(9)~~ on an underlayer ~~(15)~~ of the first raw mix ~~(8)~~ before clinkering.

26. (Amended) ~~Installation~~ The apparatus for manufacture of a cement ~~(1)~~ according to ~~any one of Claims Claim~~ Claim 20-25 ~~characterized in that it consists of~~ including a first grinding mill ~~(20)~~ of for grinding the clinkered mixture ~~(7)~~ for the preparation of to produce a ground clinkered mixture ~~(30)~~, a second mixer ~~(29)~~ in which there is added to the ground clinkered mixture ~~(30)~~ milled limestone and/or gypsum and/or milled anhydrite, and ~~possibly~~ heavy metals or oxidation compounds of milled heavy metals.

Amendments to the abstract:

#### ~~Descriptive~~ Abstract

Manufacturing A process of manufacturing a sulfoaluminate or ferroaluminate cement, ~~ement obtained by this process~~, and ~~installation an apparatus for implementation~~

the manufacture. The invention concerns a manufacturing process of cement (1) is manufactured from a mixture (2) containing  $\text{CaCO}_3$ ,  $\text{Al}_2\text{O}_3$  and/or  $\text{Al}(\text{OH})_3$ ,  $\text{CaSO}_4$ ,  $\text{SiO}_2$  and/or a product containing silica or silicates such as clay, these compounds being present in the anhydrous or hydrated form, individually or in combination. ThisIn this process is characterized in that, the mixture (2) is treated up to clinkering by movement in a center (3) of a kiln (4), in a sheet (5) with approximately constant thickness, at approximately constant speed, along a treatment path (6) subjected to having a positive temperature gradient, and for a treatment time during which this the mixture (2) remains below its melting temperature, and in that the. The mixture is clinkered to produce a clinkered mixture (7) that is cooled upon exit from the treatment path (6).

Drawing: Figure 1

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Application of:

BEAUVENT et al.

Application No.	Unassigned	Art Unit:	Unassigned
Filed:	August 21, 2001	Examiner:	Unassigned
For:	METHOD AND APPARATUS FOR MAKING ALUMINATE CEMENT		

**PENDING CLAIMS AFTER ENTRY OF PRELIMINARY AMENDMENT**

1. A process of manufacturing cement from a first raw mix including a mixture of (i)  $\text{CaCO}_3$ , (ii) at least one of  $\text{Al}_2\text{O}_3$  and  $\text{Al}(\text{OH})_3$ , (iii)  $\text{CaSO}_4$ , and (iv) at least one of  $\text{SiO}_2$  and a product containing silica or silicates, such as clay, in the anhydrous or hydrated form, the process including treating the mixture before a clinkering stage by movement in the center of a kiln, in a sheet with approximately constant thickness, at approximately constant speed, along a treatment path having a positive temperature gradient, and for a treatment time, during which the mixture remains below its melting temperature, to produce a sulfoaluminate cement, clinkering to produce a clinkered mixture, and cooling the clinkered mixture upon exit from the treatment path.

2. The process of manufacturing cement according to Claim 1, wherein the mixture contains  $\text{Al}_2(\text{SO}_4)_3$  in anhydrous or hydrated form.

3. The process of manufacturing cement according to Claim 2, wherein the mixture includes up to 10 wt.% of  $\text{Al}_2(\text{SO}_4)_3$ .

4. The process of manufacturing cement according to Claim 1, wherein the mixture contains at least one mineral phase including at least one iron oxidation product for obtaining a second raw mix, said cement being a ferroaluminate cement.

5. The process of manufacturing cement according to Claim 1, wherein the mixture contains an oxide of a transition metal chosen from the group consisting of Sc, Ti, V, Cr, Mn, Co, Ni, Cu, Zn, Y, Zr, Nb, Mo, Cd, La, Hf, Ta, and W.

6. The process of manufacturing cement according to Claim 5, wherein the mixture contains 5-10 wt% of the transition metal oxide.

7. The process of manufacturing cement according to Claim 1, including preparing the mixture by (i) mixing of each of the constituents of the mixture with water to obtain a slurry, (ii) filtering said slurry to obtain a pasty residue, (iii) transforming said pasty residue for introduction into the center of the kiln.

8. The process of manufacturing cement according to Claim 7, including transforming the pasty residue by mixing, and extruding plates or strips with approximately constant thickness.

9. The process of manufacturing cement according to Claim 4, including depositing the second raw mix on an underlayer of the first raw mix before clinkering.

10. The process of manufacturing cement according to Claim 1, including moving the mixture in the center of the kiln on rollers.

11. The process of manufacturing cement according to Claim 10, wherein the rollers are silicon carbide.

12. The process of manufacturing cement according to Claim 11, wherein the rollers are coated with at least one of silicon and  $\text{MgO-ZrO}_2$ .

13. The process of manufacturing cement according to Claim 10, wherein the rollers are coated with a refractory stainless steel with a melting point higher than  $1400^\circ\text{C}$ .



14. The process of manufacturing cement according to Claim 13, wherein the coating of refractory stainless steel consists of sleeves mounted for freely rotating around a roller.

15. The process of manufacturing cement according to Claim 13, wherein the refractory stainless steel coating is an Inconel® alloy.

16. The process of manufacturing cement according to Claim 1, including clinkering in the presence of oxygen.

17. The process of manufacturing cement according to Claim 1, wherein the mixture is subjected, along the treatment path, successively to drying and/or dehydration, decarbonation, and clinkering.

18. The process of manufacturing cement according to Claim 1, including milling the clinkered mixture and mixing the clinkered mixture, after milling, with at least one material selected from the group consisting of limestone, gypsum, anhydrite, heavy metals, and oxidation compounds of heavy metals.

20. An apparatus for manufacture of a cement consisting of a tank, a first mixer for preparing a first raw mix from a mixture consisting of the compounds  $\text{CaCO}_3$ ,  $\text{Al}_2\text{O}_3$  and/or  $\text{Al}(\text{OH})_3$ ,  $\text{CaSO}_4$ ,  $\text{SiO}_2$  and/or a product containing silica or silicates, such as clay, a kiln having a kiln center for treating the mixture up to clinkering by movement in said kiln center with a sheet of approximately constant thickness, at approximately constant speed, along a treatment path having a positive temperature gradient, and for a treatment time during which the mixture remains below its melting temperature, and equipment for rapid cooling of a clinkered mixture upon exit from the treatment path.

21. The apparatus for manufacture of a cement according to Claim 20, including (i) a first mixer associated with said tank for producing a slurry during combination of the mixture with water, (ii) a filter press for filtration of the slurry in order to obtain a pasty

residue, and (iii) an extruder for transforming said pasty residue into plates or strips with approximately constant thickness for introduction into the kiln.

22. The apparatus for manufacture of a cement according to Claim 21, including a mixer for homogenization of the pasty residue prior to introduction into the extruder.

23. The apparatus for manufacture of a cement according to Claim 20, wherein the center of the kiln includes rollers for movement of the mixture.

24. The apparatus for manufacture of a cement according to Claim 20, including means for adding at least one mineral phase including at least one iron oxidation product for obtaining a second raw mix.

25. The apparatus for manufacture of a cement according to Claim 24, including means for depositing the second raw mix on an underlayer of the first raw mix before clinkering.

26. The apparatus for manufacture of a cement according to Claim 20, including a first grinding mill for grinding the clinkered mixture to produce a ground clinkered mixture, a second mixer in which there is added to the ground clinkered mixture milled limestone and/or gypsum and/or milled anhydrite, and heavy metals or oxidation compounds of milled heavy metals.